



## General

### Guideline Title

Evidence-based care guideline for management of idiopathic toe walking in children and young adults ages 2 through 21 years.

### Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Evidence-based care guideline for management of idiopathic toe walking in children and young adults ages 2 through 21 years. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2011 Feb 15. 17 p. [49 references]

### Guideline Status

This is the current release of the guideline.

## Recommendations

### Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of evidence (1a-5) are defined at the end of the "Major Recommendations" field.

Assessment (see Appendix 1 in the original guideline document: Screening Algorithm)

1. It is recommended that children 2 years of age or older who toe walk are referred to physical therapy (Burnett & Johnson, 1971 [4b]; Sutherland et al., 1980 [5]; Tidwell, 1999 [5a]).
2. It is recommended that a comprehensive Physical Therapy Examination be completed, including the components named in Table 1 below (Williams, Tinley, & Curtin, 2010 [4a]; American Physical Therapy Association, 2003 [5]).

Table 1. Components of Physical Therapy Examination History

| History                  |   |
|--------------------------|---|
| Parent report of history | <ul style="list-style-type: none"><li>• Obtain birth history (hx) (Hicks, Durinick, &amp; Gage, 1988 [4b])</li><li>• Obtain medical hx (American Physical Therapy Association, 2003 [5])</li><li>• Obtain developmental hx<ul style="list-style-type: none"><li>• Gross Motor (GM) skills (Furrer &amp; Deonna, 1982 [4b]; Clark, 2010 [5a])</li><li>• Determine balance concerns (Sobel, Caselli, &amp; Velez, 1997 [4b])</li><li>• Onset of toe walking</li></ul></li></ul> |

|                               |   |
|-------------------------------|---|
|                               | <ul style="list-style-type: none"> <li>Family hx of toe walking and/or of medical conditions associated with toe walking (Williams, Tinley, &amp; Curtin, 2010 [4a]; Katz &amp; Mubarak, 1984 [4b]; Sala et al., 1999 [5a])</li> <li>Review current and past therapeutic interventions for idiopathic toe walking (ITW): i.e., physical therapy (PT), occupational therapy (OT), Orthopedics, Podiatrist, Neurologist, Physical Medicine and Rehabilitation (PM&amp;R) (Hill, 1995 [4b]; American Physical Therapy Association, 2003 [5])</li> </ul>  |
| Systems Review                |   |
| Pain Assessment               | <ul style="list-style-type: none"> <li>Utilize appropriate pain scale</li> <li>Localize pain</li> <li>What improves/worsens pain? (Sobel, Caselli, &amp; Velez, 1997 [4b]; Clark, 2010 [5a])</li> </ul>   |
| Integument                    | <ul style="list-style-type: none"> <li>Presence of calluses, bunions, or redness on feet</li> </ul>   |
| Speech and language screen    | <ul style="list-style-type: none"> <li>Communication subsection of "Ages and Stages Questionnaire" (for ages: 4 months to 60 months) if indicated (Accardo et al., 1992 [4b])</li> </ul>  |
| Sensory processing screen     | <ul style="list-style-type: none"> <li>Short Sensory Profile (for ages 3 years to 10 years 11 months) (Montgomery &amp; Gauger, 1978 [4b]) by first treatment visit</li> </ul>  |
| Physical Assessment           |   |
| Neurological exam             | <ul style="list-style-type: none"> <li>Assess muscle tone <ul style="list-style-type: none"> <li>Modified Ashworth (ankle plantarflexors &amp; knee flexors)</li> <li>Clonus</li> </ul> </li> </ul> (Brouwer, Davidson, & Olney, 2000 [4a]; Rose et al., 1999 [4a])   |
| Musculoskeletal exam          | <ul style="list-style-type: none"> <li>Ankle dorsiflexion (DF) passive range of motion (PROM) in subtalar neutral (STN) with knee flexed and extended (Brouwer, Davidson, &amp; Olney, 2000 [4a]; Rose et al., 1999 [4a]; Hill, 1995 [4b]; Caselli, Rzonca, &amp; Lue, 1988 [5]; Local Consensus [5]).</li> <li>Ankle DF active range of motion (AROM) with knee extended</li> <li>Muscle length tests: Thomas test (hip flexors), Hamstring length test (Clark, 2010 [5a])</li> <li>Lower extremity (LE) alignment: Thigh foot angle (TFA) (Stott, 2004 [4a]), Hindfoot/forefoot alignment in STN (non-weight bearing) (Stott, 2004 [4a]; Local Consensus [5])</li> <li>Standing Posture (McMulkin et al., 2006 [4a]; Clark, 2010 [5a])</li> <li>Assess LE strength (manual muscle testing [MMT] and/or functional assessment) <ul style="list-style-type: none"> <li>Anterior tibialis</li> <li>Gastrocnemius</li> </ul> (Hemo et al., 2006 [4a]; Brouwer, Davidson, &amp; Olney, 2000 [4a])</li> <li>Assess Trunk/Core strength (Local Consensus [5])</li> </ul> |
| Gait exam                     | <ul style="list-style-type: none"> <li>Observational Gait Scale (OGS) (Stott, 2004 [4a]; Mackey et al., 2003 [4a])</li> <li>Parent report of percentage of time toe walking (Rose et al., 1999 [4a]; Griffin et al., 1977 [4b]; Clark, 2010 [5a])</li> </ul>  |
| Gross motor skills assessment | <ul style="list-style-type: none"> <li>Squatting to/from standing, position of foot in squatting</li> <li>Transition floor to stand</li> <li>Stairs</li> <li>Balance <ul style="list-style-type: none"> <li>Static and dynamic standing balance</li> </ul> </li> </ul>  |

- Single limb stance
- Balance beam
- Jumping/Hopping
- Coordination
- Determine need for standardized testing (Clark, 2010 [5a])

Screenings and Recommended Referrals to Other Disciplines (Shulman et al., 1997 [4b]; Caselli, Rzonca, & Lue, 1988 [5])

3. It is recommended that a recommendation for referral to the appropriate specialist be made to the primary care provider if: (American Physical Therapy Association, 2003 [5])

- Sensory processing dysfunction is reported or observed (Occupational Therapy) (Montgomery & Gauger, 1978 [4b])

Note 1: Use of the Short Sensory Profile by first treatment visit (Local Consensus [5]).

- Speech and language delay is reported or observed (Speech Language Pathology) (Accardo et al., 1992 [4b]).

Note 1: Use of the Communication subsection of the "Ages and Stages Questionnaire" if indicated (Local Consensus [5]).

- Signs/symptoms of a central or peripheral nervous system disorder, a neuromuscular disorder or a myopathy are noted (PM&R or Neurology) (Rose et al., 1999 [4a]; Hicks, Durinick, & Gage, 1988 [4b]; Harris, 1999 [5]; Caselli, Rzonca, & Lue, 1988 [5])
- Presence of significant structural equinus or congenital orthopedic condition (Orthopedics) (Hemo et al., 2006 [4a]; Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5])
- Child does not achieve 10 degrees of ankle DF PROM with knee extended despite conservative therapeutic interventions (Orthopedics and/or PM&R) (Local Consensus [5])

4. It is recommended that physical therapy intervention be initiated when an individual exhibits any of the following:

- Limitations in ankle DF PROM or AROM (Brouwer, Davidson, & Olney, 2000 [4a]; Rose et al., 1999 [4a]; Hill, 1995 [4b])
- Limitations in ankle DF strength (Hemo et al., 2006 [4a]; Brouwer, Davidson, & Olney, 2000 [4a])
- Gait abnormalities (Rose et al., 1999 [4a]; Griffin et al., 1977 [4b])
- Decreased balance (Local Consensus [5])

Treatment Recommendations (See Appendix 2 in the original guideline document: Intervention and Treatment Frequency Algorithm)

Overall Considerations

*Initial Treatment Visit*

5. It is recommended that the initial treatment of ITW include:

- Review: home exercise program (HEP) given at PT evaluation (Local Consensus [5])
- Reassess/assess:
  - DF PROM with knee flexed and extended, measured in STN (Brouwer, Davidson, & Olney, 2000 [4a]; Rose et al., 1999 [4a]; Hill, 1995 [4b])
  - Gait (Mackey et al., 2003 [4a]; Caselli, Rzonca, & Lue, 1988 [5])
  - Percent of time spent toe walking at home (document with shoes or barefoot) (Local Consensus [5]; Clark, 2010 [5a])
  - Gross motor skill screen to determine if standardized testing is appropriate (Shulman et al., 1997 [4b]; Furrer & Deonna, 1982 [4b])
- Initiate: orthotics or serial casting (see Appendix 2 in the original guideline document) (Local Consensus [5]; Gourdine-Shaw et al., 2010 [5a])
- Provide instruction: gastrocnemius and soleus stretch; trunk and/or LE strengthening (Tabrizi, 2000 [4a]; Tidwell, 1999 [5a])
- Provide education: etiology of ITW, treatment plan, and goals (Local Consensus [5])

Note: Education to include:

- Impact of decreased ankle PROM including potential for foot pain or injury (DiGiovanni et al., 2002 [4a]; Tabrizi, 2000 [4a]; Gourdine-Shaw et al., 2010 [5a])
- Muscle length needed for age appropriate gait pattern (Tabrizi, 2000 [4a]; Gourdine-Shaw et al., 2010 [5a])
- Changes in muscle composition and function due to toe walking (Sobel, Caselli, & Velez, 1997 [4b])

- Motor learning process to attain mature gait pattern (Sutherland et al., 1980 [5]; Clark, 2010 [5a])
- Discussion with options of treatment (such as night splinting versus serial casting) (Fox et al., 2006 [4a]; Brouwer, Davidson, & Olney, 2000 [4a]; Griffin et al., 1977 [4b])

(American Physical Therapy Association, 2003 [5])

#### *Subsequent Visits: Every Visit or After Serial Casting Episode*

#### 6. It is recommended that all subsequent visits include:

- Re-assess:
  - DF PROM with knee flexed and extended, measured in STN and DF AROM (Brouwer, Davidson, & Olney, 2000 [4a]; Rose et al., 1999 [4a]; Hill, 1995 [4b])
  - Gait (Caselli, Rzonca, & Lue, 1988 [5])  
Perform OGS when positive or negative changes occur in gait (Mackey et al., 2003 [4a])
  - Report of percent of time spent heel-toe walking during spontaneous gait (with shoes or barefoot) (Clark, 2010 [5a])
- Review/modify HEP (parent demonstration) (Tabrizi, 2000 [4a]; Tidwell, 1999 [5a])
- PT interventions may include: stretching of the gastrocnemius and soleus and other trunk/LE muscles, trunk/LE strengthening (including possible taping or neuromuscular electrical stimulation [NMES]), manual therapy (including joint mobilizations), balance and coordination training, gait/treadmill training (including augmented auditory feedback), orthotic intervention and development of a HEP (Westberry et al., 2008 [4a]; Hemo et al., 2006 [4a]; Tabrizi, 2000 [4a]; Jacks et al., 2004 [4b]; Sobel, Caselli, & Velez, 1997 [4b]; Hill, 1995 [4b]; Katz & Mubarak, 1984 [4b]; Conrad & Bleck, 1980 [4b]; Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5]; Gourdine-Shaw et al., 2010 [5a]; Tidwell, 1999 [5a]).
- Standardized testing of gross motor skills if indicated (Furrer & Deonna, 1982 [4b]; Clark, 2010 [5a]; Gourdine-Shaw et al., 2010 [5a]).
- PT frequency may be increased at any point due to difficulty with HEP or PT treatment or decreased progress towards goals. PT treatment frequency may be decreased at any point due to accelerated progress towards goals and/or independence with HEP (Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]).

(American Physical Therapy Association, 2003 [5])

#### *Frequency and Progression of Intervention*

#### Individuals with Less Than or Equal to 0 Degrees Ankle DF PROM with Knee Extended Measured in STN

7. It is recommended that a recommendation for serial casting be made to the primary care provider. Therapy intervention to focus on serial casting (with or without Botox) on a weekly basis. (Fox et al., 2006 [4a]; Brouwer, Davidson, & Olney, 2000 [4a]; Griffin et al., 1977 [4b]; Local Consensus [5]; Tidwell, 1999 [5a]).

Goal is to increase ankle DF with knee extended (measured in STN) to greater than or equal to 10 degrees.

Note 1: Botox in conjunction with serial casting may improve outcomes (Jacks et al., 2004 [4b]; Gormley, 1997 [4b]).

Note 2: Serial casting to be conducted according to the companion guideline: Evidence-based Care Guideline for Serial Casting of the Lower Extremity (Cincinnati Children's Hospital Medical Center, 2009 [5]).

Note 3: Knee immobilizers may be worn in conjunction with serial casting if tolerated by client to improve gastrocnemius length gains (Local Consensus [5]).

8. It is recommended that consideration of a referral to Physical Medicine and Rehabilitation (PM&R) for possible Botox injections or Orthopedics for potential surgical intervention when PROM continues to be less than or equal to neutral following serial casting (Hemo et al., 2006 [4a]; Jacks et al., 2004 [4b]; Cottalorda et al., 2000 [4b]; Gormley, 1997 [4b]; Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5]).

#### Individuals with 0 to 5 Degrees of Ankle DF PROM with Knee Extended Measured in STN

9. It is recommended that weekly therapy intervention focus on night splinting. Additional PT interventions may include: stretching gastrocnemius and soleus, trunk & LE strengthening, manual therapy, gait/treadmill training, balance training, possible orthotic intervention, and/or HEP (Tabrizi, 2000 [4a]; American Physical Therapy Association, 2003 [5]; Local Consensus [5]).  
Goals are to increase ankle DF with knee extended to greater than or equal to 10 degrees measured in STN (Tabrizi, 2000 [4a]; Gourdine-Shaw et al., 2010 [5a]) and to decrease the reported frequency of toe walking by individual or caregiver (Local Consensus [5]; Clark, 2010 [5a]).

10. It is recommended that night splinting be initiated (Local Consensus [5]).  
Note: Night splinting to be attempted for 4 to 6 months (Local Consensus [5]).
11. It is recommended that if ankle DF PROM with knee extended continues to be less than or equal to 5 degrees after 4 to 6 months of night splinting, serial casting with or without Botox is indicated on a weekly basis (Local Consensus [5]).  
Goal is to increase ankle DF PROM with knee extended, measured in STN to greater than or equal to 10 degrees (Tabrizi, 2000 [4a]; Gourdine-Shaw et al., 2010 [5a]).

Note 1: Consultation with the referring physician regarding initiation of serial casting (Local Consensus [5]).

Note 2: Serial casting to be conducted according to the companion guideline: Evidence-based Care Guideline for Serial Casting of the Lower Extremity (Cincinnati Children's Hospital Medical Center, 2009 [5]; Local Consensus [5]).

Note 3: Knee immobilizers may be worn in conjunction with serial casting or night splinting if tolerated by client to improve gastrocnemius lengthening (Local Consensus [5]).

#### Individuals with 5 to 10 Degrees of Ankle DF PROM with Knee Extended Measured in STN

12. It is recommended that every other week weekly PT intervention focus on articulated ankle foot orthotic (AFO), possible night splint, stretching, trunk/LE strengthening, manual therapy, gait/treadmill training, balance training, and HEP development (Hemo et al., 2006 [4a]; Stott, 2004 [4a]; Tabrizi, 2000 [4a]; Jacks et al., 2004 [4b]; Stricker & Angulo, 1998 [4b]; Gormley, 1997 [4b]; Sobel, Caselli, & Velez, 1997 [4b]; Hill, 1995 [4b]; Katz & Mubarak, 1984 [4b]; Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5]; Gourdine-Shaw et al., 2010 [5a]; Tidwell, 1999 [5a]).

Goals of intervention are to:

- Increase ankle DF range of motion with knee extended to greater than 10 degrees (Tabrizi, 2000 [4a]; Sutherland et al., 1980 [5]; Tidwell, 1999 [5a])
- Increase heel toe gait pattern with or without AFOs (Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5])
- Demonstrate second rocker during stance phase of gait (Local Consensus [5]; Clark, 2010 [5a])
- Improve higher level balance skills (Local Consensus [5])

13. It is recommended that after 4 to 6 months without improvement in PROM or gait, consider increasing frequency of treatment or referral to PM&R (Engstrom, 2010 [4a]; Brunt et al., 2004 [4b]; Jacks et al., 2004 [4b]; Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]; Tidwell, 1999 [5a]).

Note: Communication with primary care provider regarding referral to PM&R (local consensus).

14. It is recommended that after 12 months of PT intervention, reassessment of progress toward goals be completed. When goals are met discharge is indicated. When patient/family demonstrates non-compliance with HEP or PT treatment, discharge may be indicated. When individual is not making progress toward goals or having difficulty with HEP or PT treatment, increased frequency of treatment may be indicated. When patient continues to progress towards goals, continue PT plan of care. (Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]).

Note 1: Need for articulated AFOs, foot orthotics, night splints and/or HEP should be established prior to discharge (Local Consensus [5]).

Note 2: Periodic follow-up by PT may be required for orthotics (local consensus).

#### Individuals with Greater than 10 Degrees in Ankle DF PROM with Knee Extended Measured in STN

15. It is recommended that if the individual demonstrates heel-toe walking greater than 75% of the time during spontaneous gait that he/she is discharged with HEP (Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]; Tidwell, 1999 [5a]).

Note: Foot orthotics may be needed to provide neutral foot alignment and prevent recurrence of ankle plantarflexor contracture (Local Consensus [5]).

16. It is recommended that when an individual performs heel-toe walking less than 75% of the time physical therapy continue on a every other week basis for 4 to 6 months. Treatment focus may include: daytime articulated AFO's, night splinting, stretching, trunk/LE strengthening, manual therapy, gait/treadmill training, balance training, and HEP (Hemo et al., 2006 [4a]; Tabrizi, 2000 [4a]; Jacks et al., 2004 [4b]; Sobel, Caselli, & Velez, 1997 [4b]; Hill, 1995 [4b]; Katz & Mubarak, 1984 [4b]; Caselli, Rzonca, & Lue, 1988 [5]; Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]; Tidwell, 1999 [5a]).

Goals of intervention are to:

- Maintain or increase ankle DF PROM with knee extended measured in STN to at least 10 degrees (Tabrizi, 2000 [4a])
- Improve heel-toe ambulation frequency to 75% of spontaneous gait as reported by parent/caregiver (Local Consensus [5])
- Improvement in Observational Gait Scale score (Stott, 2004 [4a])
- Increase heel toe gait pattern when not wearing AFO (Local Consensus [5])

Note: Patient may need foot orthotics to improve foot alignment during gait and prevent recurrence of gastrocnemius and/or soleus contracture (Local Consensus [5]).

17. It is recommended that after 4 to 6 months without improvement in heel-toe frequency during spontaneous gait, referral to PM&R be considered. Continue to provide plan of care while awaiting specialty consult (Engstrom, 2010 [4a]; Brunt et al., 2004 [4b]; Jacks et al., 2004 [4b]; Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]; Tidwell, 1999 [5a]).

Note: Communicate with primary provider regarding referral to PM&R (local consensus).

18. It is recommended that after 12 months of total PT intervention, reassess progress toward goals. Continue PT plan of care when patient continues to make progress towards goals. When PT has reached a plateau towards goals, it is recommended that patient be referred to PM&R. Discharge when goals are met or when individual/caregiver is noncompliant with HEP or PT treatment (Engstrom, 2010 [4a]; Brunt et al., 2004 [4b]; Jacks et al., 2004 [4b]; Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]).

Note: Communicate with primary care provider regarding referral to PM&R if indicated (Local Consensus [5]).

Note: Patient may need foot orthotics to improve foot alignment during gait and prevent recurrence of gastrocnemius and/or soleus contracture (Local Consensus [5]).

19. PT frequency may be increased at any point due to difficulty with HEP or PT treatment or decreased progress towards goals. PT treatment frequency may be decreased at any point due to accelerated progress towards goals and/or independence with HEP.

#### Discharge from Therapy

20. It is recommended that a child be discharged from therapy when the child/caregiver is noncompliant with PT treatment or HEP or when the following therapy goals have been met (Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]):

- Ankle DF PROM greater than or equal to 10 degrees with knee extended, measured in STN (McMulkin et al., 2006 [4a]; Tabrizi, 2000 [4a]; Sutherland et al., 1980 [5]; Tidwell, 1999 [5a])
- Heel-toe ambulation greater than 75% of spontaneous gait and/or parent/caregiver satisfaction (Bailes, Reder, & Burch, 2008 [5a])
- Improvement in OGS score (Local Consensus [5])
- Independence in home exercise program (Local Consensus [5])
- Maximization of gross motor skills (Local Consensus [5]; Clark, 2010 [5a])

21. It is recommended that children with persistent toe walking due to lack of progress with above interventions or lack of compliance discontinue physical therapy with instruction to continue ankle plantar flexor stretches, use of AFOs or foot orthotics and/or night splints (Local Consensus [5]; Bailes, Reder, & Burch, 2008 [5a]).

Note: PT intervention may be needed on a periodic basis to manage orthotic needs (Local consensus).

22. It is recommended that parents be instructed that plateaus in ankle passive or active ROM and/or regression to toe walking may occur during times of:

- Growth spurt
- Anxiety
- Fatigue/illness
- Lack of follow through at home

(Local Consensus [5])

During these instances if no improvements are seen after resuming HEP over 4 weeks, therapy reassessment may be indicated (Local Consensus [5]).

#### Definitions:

#### Table of Evidence Levels

| Quality Level | Definition  |
|---------------|---|
| 1a† or 1b†    | Systematic review, meta-analysis, or meta-synthesis of multiple studies |

| Quality Level | Definition   |
|---------------|--|
| 1a or 1b      | Best study design for domain   |
| 3a or 3b      | Fair study design for domain   |
| 4a or 4b      | Weak study design for domain   |
| 5             | Other: General review, expert opinion, case report, consensus report, or guideline |

†a = good quality study; b = lesser quality study

#### Table of Recommendation Strength

| Strength  | Definition  |
|---|---|
| "Strongly recommended"  | There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations). |
| "Recommended"   | There is consensus that benefits are closely balanced with risks and burdens.                                     |
| No recommendation made  | There is lack of consensus to direct development of a recommendation.   |
| <p>Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.</p> <ol style="list-style-type: none"> <li>1. Grade of the Body of Evidence (see note above)</li> <li>2. Safety/Harm</li> <li>3. Health benefit to patient (direct benefit)</li> <li>4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)</li> <li>5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis)</li> <li>6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])</li> <li>7. Impact on morbidity/mortality or quality of life</li> </ol> |   |

## Clinical Algorithm(s)

Algorithms are provided in the appendices of the original guideline document for screening and for intervention and treatment.

## Scope

### Disease/Condition(s)

Idiopathic toe walking

### Guideline Category

Evaluation

Screening

Treatment

# Clinical Specialty

Family Practice

Internal Medicine

Pediatrics

Physical Medicine and Rehabilitation

## Intended Users

Advanced Practice Nurses

Nurses

Occupational Therapists

Patients

Physical Therapists

Physician Assistants

Physicians

## Guideline Objective(s)

- To provide optimal skilled care to patients
- To promote appropriate referrals
- To improve functional outcomes
- To decrease unwarranted variation in care
- To improve patient/family satisfaction
- To decrease/delay the need for invasive procedures

## Target Population

Inclusions

Children or young adults:

- With onset of toe walking since independent ambulation
- Who toe walk bilaterally
- With habitual or idiopathic toe walking
- Ages 2 to 21 years

Exclusions

Children or young adults with:

- A central nervous system disorder such as cerebral palsy (CP)
- Autism/Pervasive Development Disorder (PDD)
- A myopathy such as Duchenne's Muscular Dystrophy or Becker's Muscular Dystrophy
- A peripheral neuropathy such as Charcot Marie Tooth
- A neuromuscular disorder such as Spinal Muscular Atrophy
- Tethered Spinal Cord Syndrome
- A congenital orthopedic condition such as Talipes Equinovarus (clubfoot)
- Unilateral toe walking

- Sudden onset of toe walking

## Interventions and Practices Considered

### Evaluation

Physical therapy examination, including:

- Parent report of history
- Pain assessment
- Integument
- Speech and language screen
- Sensory processing screen
- Neurological exam
- Musculoskeletal exam
- Gait exam
- Gross motor skills assessment

### Screening

Referral to the appropriate specialist

### Treatment

1. Review of home exercise program (HEP)
2. Assess dorsiflexion (DF) passive range of motion (PROM), gait (Observational Gait Scale, as applicable), percent of time spent toe walking at home, and gross motor skill screen
3. Orthotics or serial casting
4. Physical therapy, including: stretching of the gastrocnemius and soleus and other trunk/lower extremity (LE) muscles, trunk/LE strengthening (including possible taping or neuromuscular electrical stimulation [NMES]), manual therapy (including joint mobilizations), balance and coordination training, gait/treadmill training (including augmented auditory feedback), orthotic intervention and development of a home exercise program
5. Education
6. Botox
7. Knee immobilizers
8. Referral to Physical Medicine and Rehabilitation (PM&R) or Orthopedics
9. Night splinting
10. Discharge from therapy

## Major Outcomes Considered

- Dorsiflexion (DF) passive range of motion (PROM)
- Heel strike rate
- Gross motor and balance skills

## Methodology

### Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

To select evidence for critical appraisal by the group for this guideline, the Medline, Cinahl, Google Scholar and the Cochrane databases were searched for dates of January 1948 to August 2010 to generate an unrefined, "combined evidence" database using a search strategy focused on answering clinical questions relevant to idiopathic toe walking (ITW) (see Appendix 3 in the original guideline document) and employing a combination of Boolean searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and "natural language" searching on searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and "natural language" searching on words in the title, abstract, and indexing terms. The citations were reduced by: eliminating duplicates, review articles, non-English articles, and adult articles. The resulting abstracts were reviewed by a methodologist to eliminate low quality and irrelevant citations. During the course of the guideline development, additional clinical questions were generated and subjected to the search process, and some relevant review articles were identified.

## Number of Source Documents

Not stated

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

| Quality Level | Definition   |
|---------------|--|
| 1a† or 1b†    | Systematic review, meta-analysis, or meta-synthesis of multiple studies            |
| 2a or 2b      | Best study design for domain   |
| 3a or 3b      | Fair study design for domain   |
| 4a or 4b      | Weak study design for domain   |
| 5             | Other: General review, expert opinion, case report, consensus report, or guideline |

†a = good quality study; b = lesser quality study

## Methods Used to Analyze the Evidence

Systematic Review

## Description of the Methods Used to Analyze the Evidence

Not stated

## Methods Used to Formulate the Recommendations

Expert Consensus

## Description of Methods Used to Formulate the Recommendations

The process by which this guideline was developed is documented in the Guideline Development Process Manual (see the "Availability of Companion Documents" field); a Team Binder maintains minutes and other relevant development materials. The recommendations contained in this

document were formulated by an interdisciplinary working group which performed systematic and critical literature reviews, using the grading scale described below under "Type of Evidence Supporting the Recommendations," and examined current local practices.

Recommendations have been formulated by a consensus process directed by best evidence, patient and family preference and clinical expertise. During formulation of these recommendations, the team members have remained cognizant of controversies and disagreements over the management of these patients. They have tried to resolve controversial issues by consensus where possible and, when not possible, to offer optional approaches to care in the form of information that includes best supporting evidence of efficacy for alternative choices.

## Rating Scheme for the Strength of the Recommendations

Table of Recommendation Strength

| Strength   | Definition  |
|--|---|
| "Strongly recommended"   | There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations). |
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| No recommendation made   | There is lack of consensus to direct development of a recommendation.   |
| Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.  |   |
| <ol style="list-style-type: none"><li>1. Grade of the Body of Evidence (see note above)</li><li>2. Safety/Harm</li><li>3. Health benefit to patient (direct benefit)</li><li>4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)</li><li>5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis)</li><li>6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])</li><li>7. Impact on morbidity/mortality or quality of life</li></ol> |   |

## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

External Peer Review

Internal Peer Review

## Description of Method of Guideline Validation

The guideline has been reviewed and approved by clinical experts not involved in the development process, distributed to senior management, and other parties as appropriate to their intended purposes.

## Evidence Supporting the Recommendations

## References Supporting the Recommendations

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## Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and classified for each recommendation (see the "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

- Early identification and treatment of children with idiopathic toe walking (ITW) may decrease potential for loss of ankle passive range of motion (PROM) and improve development of mature gait.
- Early identification and conservative management of children with ITW may result in decreased necessity of more invasive treatments such as serial casting, Botox injections, or surgery in later childhood.
- Avoiding pathological outcomes in adulthood can be achieved by treatment of limited ankle dorsiflexion in childhood.

### Potential Harms

- Use of ankle foot orthotics, night splints, and/or serial casts increase risk for changes in skin integrity.
- There is a risk of over lengthening and functionally weakening the gastrocnemius with surgery to correct idiopathic toe walking.
- There are inherent risks associated with surgery and with any invasive procedure, such as Botox injections.

# Qualifying Statements

## Qualifying Statements

These recommendations result from review of literature and practices current at the time of their formulations. This guideline does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this guideline is voluntary. The physician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

## Implementation of the Guideline

### Description of Implementation Strategy

Tools to assist in the effective dissemination and implementation of the guideline may be available online at <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/guidelines.htm> .

### Implementation Tools

Clinical Algorithm

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

## Institute of Medicine (IOM) National Healthcare Quality Report Categories

### IOM Care Need

Getting Better

### IOM Domain

Effectiveness

## Identifying Information and Availability

### Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Evidence-based care guideline for management of idiopathic toe walking in children and young adults ages 2 through 21 years. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2011 Feb 15. 17 p. [49 references]

### Adaptation

Not applicable: The guideline was not adapted from another source.

## Date Released

2011 Feb 15

## Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

## Source(s) of Funding

Cincinnati Children's Hospital Medical Center

## Guideline Committee

Idiopathic Toe Walking (ITW) Evidence Based Practice Team 2010

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## Financial Disclosures/Conflicts of Interest

All Team Members and Clinical Effectiveness support staff listed above have signed a conflict of interest declaration and no financial conflicts of interest were found.

## Guideline Status

This is the current release of the guideline.

## Guideline Availability

Electronic copies: Available from the [Cincinnati Children's Hospital Medical Center](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at [EBDMInfo@cchmc.org](mailto:EBDMInfo@cchmc.org).

## Availability of Companion Documents

The following are available:

- Evidence-based care guideline development and update process. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2006 Mar. 35 p. Available in Portable Document Format (PDF) from the [Cincinnati Children's Hospital Medical Center Web site](#) .
- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May. 1 p. Available in PDF from the [Cincinnati Children's Hospital Medical Center Web site](#) .
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May. 1 p. Available in PDF from the [Cincinnati Children's Hospital Medical Center Web site](#) .
- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May. 1 p. Available in PDF from the [Cincinnati Children's Hospital Medical Center Web site](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at [EBDMInfo@cchmc.org](mailto:EBDMInfo@cchmc.org).

## Patient Resources

None available

## NGC Status

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